

NEW SPECIES AND CHANGES IN NOMENCLATURE IN
THE GENUS CLARKIA (ONAGRACEAE)

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The genus *Clarkia* has recently been the subject of extensive morphological and cytogenetical studies which indicate that *Clarkia*, *Godetia*, *Phaeostoma*, and *Eucharidium* form a natural interrelated group that should be treated taxonomically as a single genus. This is not a new idea. *Clarkia*, *Phaeostoma* and *Eucharidium* have been considered congeneric by most recent authors (e.g., Munz & Hitchcock, 1929; Jepson, 1936). Nelson and Macbride (1916) suggested that *Godetia* should be combined with *Clarkia* because they could find no consistent differentiating characters. They subsequently (1918) made most of the appropriate transfers. More recently Hiorth (1941) has examined the morphological characters that have been used to differentiate *Clarkia* and *Godetia* and has concluded that the entire group can be treated reasonably only as a single genus, but he did not adopt the generic name *Clarkia* for the species with which he worked.

We are now preparing a monograph of *Clarkia* which will present a detailed account of the relationships within the genus. In the meantime it seems desirable to publish formally certain new species and combinations in order that they may be used for other discussions.

Type specimens, permanent slides, and herbarium vouchers of collections for which chromosome numbers are given are on file at the University of California, Los Angeles.

CHANGES IN NOMENCLATURE

Clarkia bottae comb. nov. *Godetia bottae* Spach, Nouv. Ann. Mus. Par. 4:393. 1835.

Clarkia cylindrica comb. nov. *Godetia bottae* var. *cylindrica* Jepson, Univ. Calif. Publ. Bot. 2:332. 1907.

Clarkia davyi comb. nov. *Godetia quadrivulnera* var. *Davyi* Jepson, *op. cit.* p. 341.

Clarkia deflexa comb. nov. *Godetia deflexa* Jepson, *op. cit.* p. 332.

CLARKIA GRACILIS (Piper) Nels. & Macbr. subsp. ***albicaulis*** comb. nov. *Godetia amoena* var. *albicaulis* Jepson, *op. cit.* p. 329.

CLARKIA GRACILIS (Piper) Nels. & Macbr. subsp. ***sonomensis*** comb. nov. *Godetia amoena* var. *sonomensis* Hitchcock, Bot. Gaz. 89:338. 1930.

Clarkia lassenensis comb. nov. *Godetia lassenensis* Eastwood, Leaflet West. Bot. 2:281. 1940.

Clarkia mildrediae comb. nov. *Phaeostoma mildredae* Heller, Leaflet West. Bot. 2:221. 1940.

Clarkia rubicunda comb. nov. *Godetia rubicunda* Lindley, Bot. Reg. t. 1856. 1836.

Clarkia speciosa nom. nov. *Godetia parviflora* (H. & A.) Jepson, *op. cit.* p. 339, based upon the type of *Oenothera viminea* var. *parviflora* H. & A. Bot. Beech. Voy. 342. 1840. Not *Clarkia parviflora* Eastwood, Bull. Torrey Bot. Club 30:492. 1903.

Clarkia tenella comb. nov. *Oenothera tenella* Cav. Ic. 4:66, t. 396. 1797.

Clarkia williamsonii comb. nov. *Godetia williamsoni* Durand & Hilgard, Pac. R. Rep. 5 (3):7, t. 5. 1855.

NEW SPECIES

Clarkia affinis sp. nov. Herba erecta altitudine ad 8 dm.; caulibus simplicibus vel superne ramosis; foliis linearibus vel angusto-lanceolatis, integris, 1.5–7 cm. longis, 2–3 mm. latis; inflorescentium axe erecto; calycis tubo 1.5–4 mm. longo et annulo pilorum ad medium vel infra, posito, limbo 5–10 (14) mm. longo, 1.5–2 mm. lato sub anthesi connato et declinato; petalis obovatis 5–15 mm. longis pallido-roseis vel roseo-purpureis et frequens ad basim pallidioribus purpureo-punctulatis; staminibus 8, plerumque stigmatate adhaerentibus; stigmatate quadrifido, lobis brevibus; stylo stamina aequante; ovario gracile cinereo-pubescente 1.2–5 cm. longo, 8-canaliculato; capsula 1.5–3 cm. longa, 2 mm. lata.

An erect herb, as much as 8 dm. tall, simple or branched above; stems slender, puberulent above with short upwardly curled hairs, sparsely puberulent or glabrate below; leaves linear to narrowly lanceolate, entire, puberulent, 1.5–7 cm. long, 2–5 mm. broad, sessile or narrowed into petioles as much as 3 mm. long; rachis of the inflorescence erect; buds erect; hypanthium obconical, puberulent with appressed hairs, 1.5–4 mm. long, the ring of hairs at or below the middle; sepals lanceolate, often attenuate at the tip, 5–10 (rarely 14) mm. long, 1.5–2 mm. broad, appressed puberulent, usually remaining united and deflexed to one side in anthesis; petals obovate, subtire to erose, 5–15 mm. long, pale pink to lavender-pink, sometimes dark reddish-purple, usually lighter near the base, often flecked or pencilled with purple; stamens 8, in two series, white to yellow, sometimes purple spotted, usually adhering to the stigma and depositing the cream or whitish pollen upon it as the flower opens; stigma lavender to purple with 4 short lobes; style shorter than the stamens; ovary slender, densely gray puberulent with short upwardly appressed hairs, 1–2.5 cm. long, shallowly 8-grooved, sessile or sometimes on pedicels as much as 4 mm. long, gradually tapering into a short beak; capsules 1.5–3 cm. long, about 2 mm. broad, straight or slightly curved.

Type. Santa Margarita to Pozo road, 9.8 miles east of the junction with the road to Creston, San Luis Obispo County, California, May 2, 1947, *Lewis and Epling 181*.

The haploid chromosome number is 26. The populations that have been determined include the type collection.

Clarkia affinis ($n = 26$) is an allohexaploid species closely related to *C. purpurea* (Curtis) Nels. and Macbr. ($n = 26$). Cytological examination of the hybrid between them indicates that they probably have a tetraploid parent ($n = 17$) in common, but that they each have a different diploid ($n = 9$) parent. *Clarkia affinis* and *C. purpurea* apparently hybridize occasionally in nature (Mt. Diablo) and the F₁ hybrid produces a few seeds when open pollinated in the garden. The petals of *C. affinis* are often flecked; the sepals remain united and turned to one side at anthesis and the capsule is slender. The petals of *C. purpurea*, on the other hand, are not flecked; the sepals are individually reflexed at anthesis and the capsule is stocky.

Distribution. California: South Coast Ranges from Ventura County to Santa Clara, Alameda, and Contra Costa counties, and north of San Francisco Bay in Lake, Napa, Solano, and Yolo counties.

Representative specimens. Alameda County: Corral Hollow road 18.0 miles west of junction with U.S. Highway 50 at Tracy, *Lewis & Epling 198*; lower part of Arroyo Mocho, *Howell 18104*. Contra Costa County: 3.7 miles ENE of Tassajero, *Belshaw 2114*; north side of Mt. Diablo, *Howell 6483*. Monterey County: Pleyto road 2.0 miles south of the Bradley-Jolon road, *Lewis & Epling 193*; 2.5 miles north-northwest of Pleyto Well, *Graham 400*. San Benito County: 5 miles from Panoche—Itria road near mouth of canyon of Griswold Creek, *Wiggins & Ferris 9368*; 6 miles east of Paicines, *Howell 12969, 12970*. San Luis Obispo County: 8.8 miles west of U.S. Highway 101 on the northern road to Adelaida, *Lewis & Epling 189*; roadside 2 miles east of Santa Margarita on State Highway 178, *Ferris & Rossback 9432*. Santa Barbara County: summit of Nojoqui Pass, Santa Ynez Mts., *Keck & Hiesey 5138*. Santa Clara County: near Cupertino, *Heller 8552*; Uvas-Almaden road, *Mason 6947*. Solano County: near Vacaville, *Jepson* in 1891. Ventura County: Ojai Valley, *Hall 3192*. Yolo County: banks of Putah Creek near Winters, *Heller & Brown 5584*.

Clarkia lingulata sp. nov. Herba erecta altitudine ad 6 dm.; foliis lineari-lanceolatis, denticulatis, 2–6 cm. longis, 2–8 mm. latis, basi in petiolos etiam 1.5 cm. longos angustatis; inflorescentium axe apice recurvato; calycis tubo 1–4 mm. longo, annulo pilorum ad apicem posito, limbo 7–10 mm. longo, 1–1.5 mm. lato, roseo-purpureo, sub anthesi connato et declinato; petalis lingulatis vel oblanceolatis pallido-rubris, 1–2 cm. longis, 5–8 mm. latis; staminibus 8, quam stylus brevioribus; stigmatibus

quadrifido, lobis brevibus; ovario 8-costato; capsula quadrangula 1–2 cm. longa, 1.5 mm. lata.

Erect, as much as 6 dm. tall; stems simple or branched above, puberulent above with short upwardly curled hairs, sparsely puberulent below; leaf blades linear to narrowly lanceolate, denticulate to entire, 2–6 cm. long, 2–8 mm. broad, glabrate to sparsely puberulent, narrowed into petioles as much as 1.5 cm. long; rachis of the inflorescence recurved in bud, becoming erect as the flowers open, the buds pendulous; hypanthium 1–4 mm. long, the ring of hairs in the upper third; sepals lanceolate, 7–10 mm. long, 1–1.5 mm. broad, bright pink or purplish, remaining united and deflexed to one side at anthesis; petals oblanceolate, obtuse, entire or minutely notched at the summit, 1–2 cm. long, 5–8 mm. broad, bright pink, sometimes flecked with red; stamens 8, in two series, the outer blue with blue pollen, the inner shorter, white to cream with white to cream pollen; stigma white to reddish-purple with 4 short lobes; mature style exceeding the stamens, pinkish; ovary conspicuously 8-ribbed, puberulent, becoming bright green and shining, 5–10 mm. long, sessile or on pedicels as much as 7 mm. long; mature capsules straight or nearly so, quadrangular, 1–2 cm. long, about 1.5 mm. broad.

Type. Merced River 0.2 mile west of bridge over South Fork, Mariposa County, California, June 8, 1947, *Lewis & Lewis* 334.

The haploid chromosome number is 9. Samples from both of the known populations, including the type collection, have been determined.

Clarkia lingulata ($n = 9$) is most closely related to *C. biloba* (Dur.) Nels. & Macbr. ($n = 8$), from which it differs morphologically in the shape of the petal. These two species form essentially sterile hybrids when crossed in the garden.

Distribution. Known from only two localities on State Highway 140 along the Merced River, Mariposa County, California—0.2 mile west of bridge over South Fork (the type locality), *Lewis & Lewis* 334; 625; *Lewis, Lewis & Roberts* 698, 801; between 7.4 and 7.5 miles east of Bear Creek Bridge, *Lewis & Lewis* 629, *Lewis, Lewis & Roberts* 703, 796, 797.

Clarkia prostrata sp. nov. Herba prostrata vel decumbens; caulibus etiam 5 dm. longis, simplicibus vel ramosis et divaricatis; foliis oblanceolatis vel elliptis, plerumque obtusis, 1–2.5 cm. longis, 4–8 mm. latis, sessilibus; inflorescentium axe recto; calycis tubo 4–7 mm. longo, annulo pilorum infra medium posito, limbo 6–10 mm. longo, 2–3 mm. lato sub anthesi per paria recurvato; petalis obovatis interdum truncatis, 10–15 mm. longis, roseo-purpureis basi pallidioribus vel luteolis plerumque rubro-maculatis; staminibus 8; stylo stamina plus minusve aequante; stigmatibus quadrifido, lobis brevibus; capsula 8-costata, 2–3 cm. longa, 2.5–3 mm. lata.

Prostrate or decumbent, the stems as much as 5 dm. long, simple or divaricately branched, sparsely puberulent above with short upwardly curled hairs, sparsely puberulent to glabrate below; leaf blades oblanceolate to elliptic, 1–2.5 cm. long, 4–8 mm. broad, entire or nearly so, the apex usually obtuse, glabrate to sparsely puberulent, sessile or nearly so; rachis of the inflorescence straight, buds erect; hypanthium 4–7 mm. long, sometimes rosy on the outside, the ring of hairs in the lower third; sepals lanceolate, 6–8 mm. long, 2–3 mm. broad, puberulent, usually reflexed in pairs; petals fan-shaped to truncate-obovate, entire to erose or emarginate, 10–15 mm. long, lavender-pink shading to cream or pale yellow below, usually with a deltoid blotch of bright reddish-purple at the base of the lavender-pink; stamens 8; anthers cream; pollen cream; stigma 4-lobed, the lobes short; mature style equalling the shorter stamens; ovary puberulent, 10–18 mm. long, strongly 8-ribbed, sessile or essentially so; mature capsules straight to somewhat curved, quadrangular, 2–3 cm. long, 2.5–3 mm. broad.

Type. State Highway 1, 1.3 miles north of Pico Creek bridge, between San Simeon and Cambria, San Luis Obispo County, California, June 10, 1950, *Lewis & Lewis 712*.

The haploid chromosome number is 26. The type collection has not been counted. The material examined cytologically was from seeds collected near Piedras Blancas Point, San Luis Obispo County, by Dr. R. F. Hoover (our accession number 169).

Clarkia prostrata ($n = 26$) is an allohexaploid species of the sea bluffs in San Luis Obispo and Monterey counties, and morphologically closely resembles *C. davyi* (Jepson) *Lewis & Lewis* ($n = 17$), a tetraploid species of the sea bluffs of San Mateo to Humboldt counties. It differs from *C. davyi* in having larger flowers and a reddish blotch of color in the middle or lower part of the petal.

Distribution. California: sea bluffs of San Luis Obispo and Monterey counties and Santa Rosa Island, Santa Barbara County.

Specimens examined. Monterey County: Monterey, *Abbott* in 1904, *Guirado 638*; Pacific Grove, *Patterson & Wiltz* in 1907. San Luis Obispo County: State Highway 1, 0.5 miles south of Carpojo Bridge, *Lewis & Lewis 714*; Piedras Blancas, *Eastwood & Howell 5983*; State Highway 1, 0.5 miles north of Piedras Blancas, *Lewis & Lewis 713*; 1 mile north of mouth of Pico Creek (2.5 miles southeast of San Simeon), *Keck & Hiesey 5150*; San Simeon Bay near Cambria, *Eastwood 15148*; between Cambria and San Simeon, *Eastwood & Howell 5973*; Cambria, *Winblad* in 1937, *Eastwood & Howell 5943*, *Lewis & Lewis 711*; Morro Bay, *Condit* in 1911. Santa Barbara County: Santa Rosa Island, Water Canyon, *Hoffman 692*; Santa Rosa Island, *Dunn* in 1932, *Youngberg* in 1938, *Hoffman* in 1930.

Clarkia imbricata sp. nov. Herba erecta altitudine ad 6 dm., foliis crebris, imbricatis, ascendentibus, lanceolatis, 2–2.5 cm. longis, 4–7 mm. latis, integris vel denticulatis, sessilibus vel a petiolis ad 2 mm. longis extenuatis; inflorescentis densis; calycis tubo 1–1.5 cm. longo, infundibuliformi, ad 10 mm. lato, annulo pilorum infra medium ornato, limbo 1–1.5 cm. longo, 3–5 mm. lato, sub anthesi per paria recurvato; petalis flabelliformibus 2–2.5 cm. longis, roseo-purpureis apice purpureis cuneato-maculatisque; staminibus 8, quam stylus brevioribus; stigmatibus quadrifido, lobis 2 mm. longis purpureis; capsula immatura 8-costata, 1–1.5 cm. longa, 4–5 mm. lata, ea matura 3 mm. lata.

An erect herb, as much as 6 dm. tall, unbranched or with numerous short branches in the upper parts, sometimes with a few large branches from the base, densely leafy; leaves lanceolate, 2–2.5 cm. long, 4–7 mm. broad, entire to denticulate, ascending, overlapping, longer than the internodes, sessile or on petioles less than 2 mm. long; inflorescence congested; flowers showy; hypanthium conspicuous, 1–1.5 cm. long, funnel-form, flaring above the ring of hairs, as much as 1 cm. broad, conspicuously veined, the ring of hairs about 3 mm. above the base; sepals lanceolate, 1–1.5 cm. long, 3–5 mm. broad, remaining united in pairs or reflexed individually; petals fan-shaped, 2–2.5 cm. long, lavender above, pale lavender to nearly white below, light purple at the base; with a conspicuous V-shaped purple spot which extends from the middle to the upper margin of the petals; stamens 8, in two similar series, lavender, the filaments of the outer series about twice the length of the inner; pollen white; stigma lobes 2 mm. long, dark purple, held above the stamens; immature capsule 1–1.5 cm. long, 4–5 mm. broad, conspicuously and deeply 8-ribbed; mature capsule ribbed, 3 mm. broad, the beak short, less than 1 mm. long.

Type. Roadside at 6230 Vine Hill Road between Santa Rosa and Guerneville, adjacent to Pitkin Ranch, Sonoma County, California, July 10, 1951, *Lewis & Lewis* 865.

The haploid chromosome number is 8, determined from material from the type collection.

Clarkia imbricata is morphologically similar to *C. williamsonii* ($n = 9$), *C. speciosa* ($n = 9$), and certain races of *C. purpurea* ($n = 26$). It can be distinguished from them by the broad, overlapping, ascending leaves.

Distribution. Known only from the type and the following collections, all from one small area in Sonoma County, California. Pitkin Ranch along path to marsh, *M. S. Baker* 11017; dry slope bordering Pitkin Marsh, *Howell* 12315.

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LITERATURE CITED

- HIORTH, G. 1941. Zur Genetik und Systematik der Gattung *Godetia*. *Zeit. f. Ind. Abst.—u. Vererb.* 79: 199–219.
- HITCHCOCK, C. L. 1930. Revision of North American species of *Godetia*. *Bot. Gaz.* 89: 321–361.
- JEPSON, W. L. 1936. *Flora of California* 2: 573–586.
- MUNZ, P. A. & C. L. HITCHCOCK. 1929. A study of the genus *Clarkia*, with special reference to its relationship to *Godetia*. *Bull. Torrey Bot. Club* 56: 181–197.
- NELSON, A. & J. F. MACBRIDE. 1916. Western plant studies III. *Bot. Gaz.* 61: 30–47.
- NELSON, A. & J. F. MACBRIDE. 1918. Western plant studies V. *Bot. Gaz.* 65: 58–70.

RELICT ISLANDS OF XERIC FLORA WEST OF THE CASCADE MOUNTAINS IN OREGON

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A student of the Pacific Northwest flora frequently has his attention called to the occasional occurrence west of the Cascade crest of plant species whose normal range is in the more arid regions of the Rogue River Basin to the southward, or the basins and plateaus east of the Cascades. Closer investigation reveals some rather significant features in the distribution of some of these outliers—features which may have a bearing upon the study of the origins and past migrations of the Northwest flora.

In the first place, the stations where any one of the species is found are not scattered indiscriminately over the region west of the mountains. On the contrary, they are relatively few in number and in each station several to many of the outlier species are concentrated within a restricted area. In the second place, these restricted areas are in all cases mountain summits where a special set of environmental conditions obtains, producing a habitat differing considerably from that immediately surrounding it, and similar in many respects to those found